Space Weather Forecast

From the 24th of September, the way we distribute this forecast is changing and you will need to take action to continue receiving it. You should have received an email on the 4th of September explaining the steps required to do this. If you have already signed up to receive the forecast on our premium website, please disregard this message. If you haven't, or if you need help with the process, please contact moswoc@metoffice.gov.uk

Issued on Tuesday, 10 September 2024 at 12:53 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Ongoing Minor solar radiation storm (S1). Minor-Moderate geomagnetic storm G1-G2 likely Tuesday 10 into Wednesday 11 September.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Activity has been Moderate, with several low-level Moderate-class x-ray flares observed from a diverse range of sources. The peak of these was an impulsive event at 09/1708 UTC from a slowly growing sunspot region on the northeast of the Sun.

There are currently nine sunspot regions on the facing side of the Sun, most of which are the western hemisphere. These are relatively simple, except for two of them in the southwest quadrant. The largest and most complex region is now approaching the north central meridian. It consists of a large spot with penumbra preceded by a developing spot with penumbra and several little specs waxing and waning in-between. It is immediately followed by another region which is undergoing significant growth in the last 24 hours.

An asymmetric Coronal Mass Ejection (CME) was observed on satellite imagery during the early hours of the 10th, following the long-period M1.2 from the large region near the central merdian. While the bulk of the ejecta is expected to pass north of Earth, a very faint halo was detected. Preliminary analysis estimated it at 426 km/s, giving an arrival at Earth slightly after the end of Day 4. However, confidence is low.

Solar Wind / Geomagnetic Activity: The solar wind showed a possible stepped entry into a minor fast wind of unknown provenance. The solar wind speed was slightly elevated at around 400-450 km/s. The number of particles in the solar wind was erratic but small-magnitude - within typical background levels throughout. The associated magnetic field was moderate initially but slowly decreased through the period, while the north-south component varied with an overall co-aligned bias to help limit geomagnetic activity. The net result of the above solar wind measures was for provisionally mainly quiet geomagnetic activity.

Energetic Particles / Solar Radiation: Solar radiation levels (10MeV protons in near-Earth environment) showed a gradual decreasing trend, eventually returning below the S1 / Minor Storm level at around 10/0750 UTC. Flux levels peaked at 44.9 pfu at around 09/2305 UTC, where S1 begins at 10pfu. Higher energy protons showed no notable response.

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Four-Day Space Weather Forecast Summary

Solar Activity: Moderate activity is likely to continue throughout, with a daily slight chance of Strong-class flares. The complexity and flare risk of oncoming sunspot regions is likely to exceed that from any departures through midweek UTC, and the overall risk is upwards around this time.

Solar Wind / Geomagnetic Activity: No significant fast winds feature in the forecast, and the main driver of geomagnetism in the period is therefore any glance from the 08 September 'filament' CME. This is most likely due later in the UTC day of Tuesday 10 September into Wednesday 11 September with a Chance of G1-G2 Minor to Moderate geomagnetic storm. Another Earth-directed CME is possible but is considered to be outside this time frame.

Energetic Particles / Solar Radiation: A heightened risk of flare activity brings a daily chance of reaching/exceeding the S1 Minor Radiation storm level, should any significant flares occur from active regions in the western hemisphere.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	30	40	10	1
Strong	G3	No	5	5	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	70	70	70
Very Active	R3 to R5 X	No	10	15	15	15

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	30	20	20	20
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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